

explicit reason for failure that can be logged. In some configurations, event **2117** can be escalated, where escalation can include reporting events **2117** that can be associated with the reported event. In some configurations, event entry **2121** can specify an accumulator to be incremented when event **2117** is detected. In some configurations, the accumulators in all of PB **39/41**, UC **130**, and PSC **98/99** can be managed by PSC **98/99** and accessed by an external application. In some configurations, event entry **2121** can include a specification of a service-required indication associated with event **2117**, which can also be managed by PSC **98/99** and retrieved by an external application as described herein. In some configurations, event entry **2121** can include a black box trigger name to be used when event **2117** is detected. Restriction processor **2113** can extract from event entry **2121** information about immediate and downstream effects of event **2117**. In some configurations, immediate effects can include user notifications, for example, audible and visible notifications can be made available when the battery needs to be charged, when the temperature of the MD exceeds a pre-selected threshold, and when the MD needs service. Immediate effects can also include notifying the user of the severity of event **2117**. In some configurations, downstream effects can include restricting operational modes based on events **2117**. In some configurations, entry can be restricted into enhanced, balance, stair, and remote modes. In some configurations, downstream effects can include effects on the operation of the MD, for example limiting speed, disabling motion, transitioning into certain modes automatically, restricting MD lean, restricting power off, and blocking external application communication. In some configurations, a return to 4-wheel mode can be automatic under certain pre-selected conditions such as, for example, but not limited to, the transition to balancing on two wheels has failed, the pitch of the MD has exceeded the safe operating limit for balance mode, and/or the wheels have lost traction in balance mode.

[0517] Continuing to refer to FIG. **33**, indications processor **2115** can extract from event entry **2121** any indications that should be raised as a result of event **2117**. In some configurations, indications can be raised when there is a loss of communications between components of the MD, for example, between PSC **98/99** and UC **130**, and between PB **39** and PB **41**, and when battery voltage is below a pre-selected threshold. In some configurations, event entry **2121** can provide communications between processes, for example, status flags can provide the status of seat, cluster, yaw, pitch, and IMU indicators.

[0518] Configurations of the present teachings are directed to computer systems for accomplishing the methods discussed in the description herein, and to computer readable media containing programs for accomplishing these methods. The raw data and results can be stored for future retrieval and processing, printed, displayed, transferred to another computer, and/or transferred elsewhere. Communications links can be wired or wireless, for example, using cellular communication systems, military communications systems, and satellite communications systems. Parts of the system can operate on a computer having a variable number of CPUs. Other alternative computer platforms can be used.

[0519] The present configuration is also directed to software for accomplishing the methods discussed herein, and computer readable media storing software for accomplishing these methods. The various modules described herein

can be accomplished on the same CPU, or can be accomplished on a different computer. In compliance with the statute, the present configuration has been described in language more or less specific as to structural and methodical features. It is to be understood, however, that the present configuration is not limited to the specific features shown and described, since the means herein disclosed comprise preferred forms of putting the present configuration into effect.

[0520] Methods can be, in whole or in part, implemented electronically. Signals representing actions taken by elements of the system and other disclosed configurations can travel over at least one live communications network. Control and data information can be electronically executed and stored on at least one computer-readable medium. The system can be implemented to execute on at least one computer node in at least one live communications network. Common forms of at least one computer-readable medium can include, for example, but not be limited to, a floppy disk, a flexible disk, a hard disk, magnetic tape, or any other magnetic medium, a compact disk read only memory or any other optical medium, punched cards, paper tape, or any other physical medium with patterns of holes, a random access memory, a programmable read only memory, and erasable programmable read only memory (EPROM), a Flash EPROM, or any other memory chip or cartridge, or any other medium from which a computer can read. Further, the at least one computer readable medium can contain graphs in any form, subject to appropriate licenses where necessary, including, but not limited to, Graphic Interchange Format (GIF), Joint Photographic Experts Group (JPEG), Portable Network Graphics (PNG), Scalable Vector Graphics (SVG), and Tagged Image File Format (TIFF).

[0521] While the present teachings have been described above in terms of specific configurations, it is to be understood that they are not limited to these disclosed configurations. Many modifications and other configurations will come to mind to those skilled in the art to which this pertains, and which are intended to be and are covered by both this disclosure and the appended claims. It is intended that the scope of the present teachings should be determined by proper interpretation and construction of the appended claims and their legal equivalents, as understood by those of skill in the art relying upon the disclosure in this specification and the attached drawings.

1. A method for controlling speed of a mobility device, the mobility device including a plurality of wheels, at least one cluster assembly, and a plurality of sensors, the method comprising:

- receiving terrain and obstacle detection data from the plurality of sensors;
- mapping terrain and obstacles, if any, in real time based at least on terrain and obstacle detection data;
- computing collision possible areas, if any, based at least on the mapped data;
- computing slow-down areas if any based at least on the mapped data and the speed of the mobility device;
- receiving user preferences, if any, with respect to the slow-down areas and desired direction and speed of motion;
- computing movement commands to command the plurality of wheels based at least on the collision possible areas, the slow-down areas, and user preferences; and